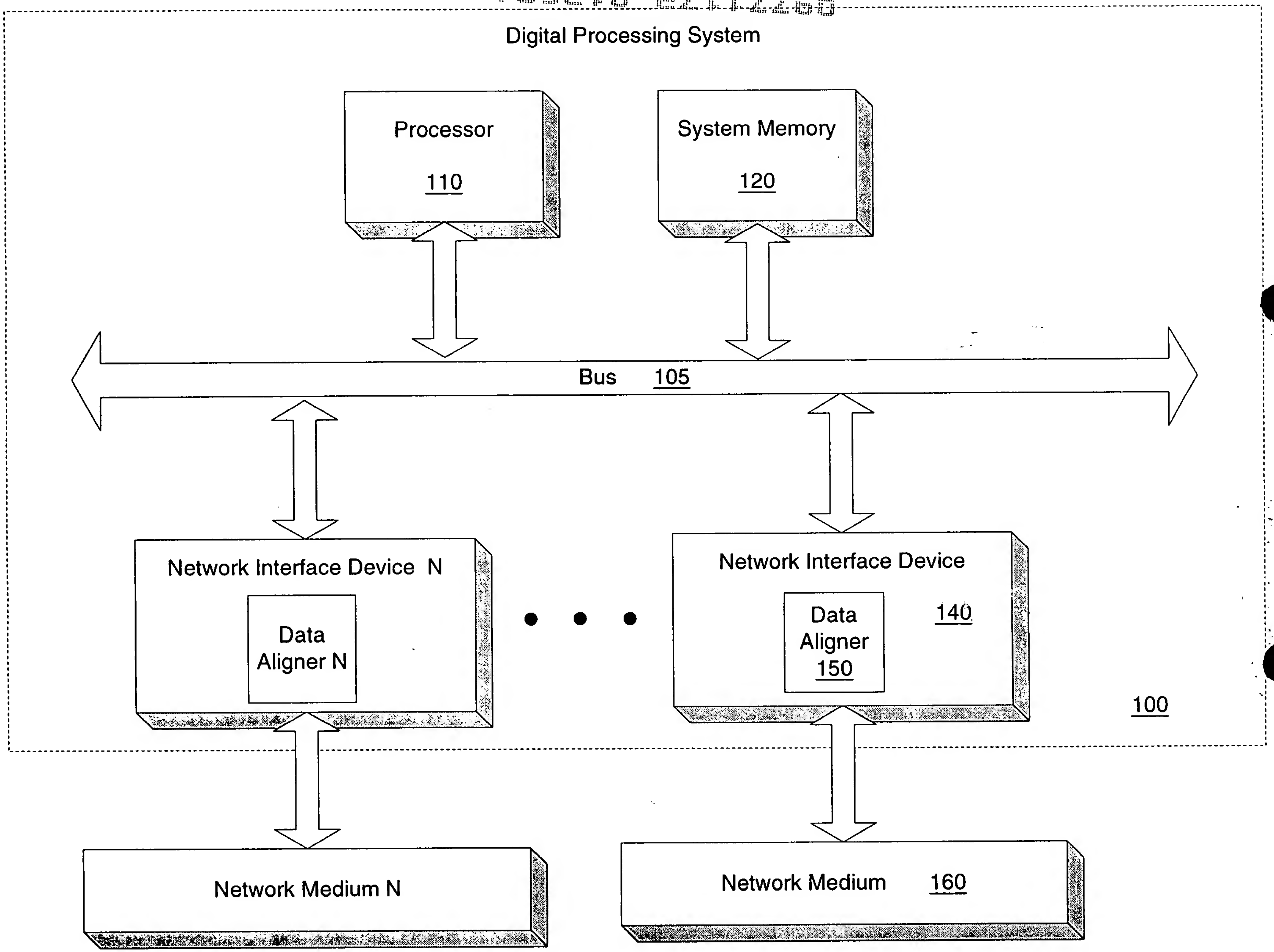
Digital Processing System
Processor
110
System Memory
120
Bus
105
Network Interface Device N
Data
Aligner N
Network Interface Device
Data
Aligner
150
140
100
Network Medium N
Network Medium
160

Figure 1

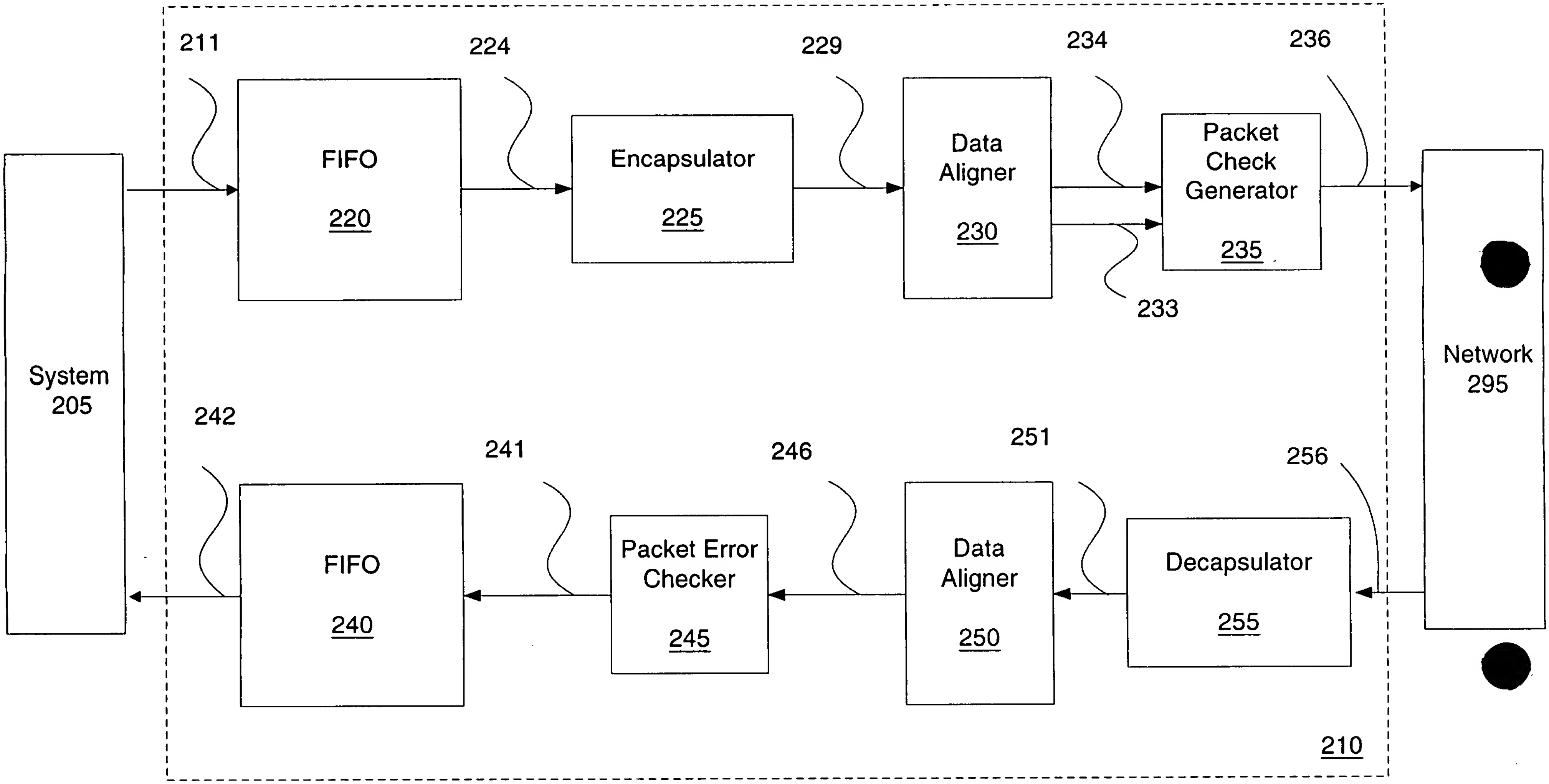
211
224
229
234
236
System
205
FIFO
220
Encapsulator
225
Data
Aligner
230
Packet
Check
Generator
235
233
Network
295
242
241
246
251
256
FIFO
240
Packet Error
Checker
245
Data
Aligner
250
Decapsulator
255
210

Figure 2

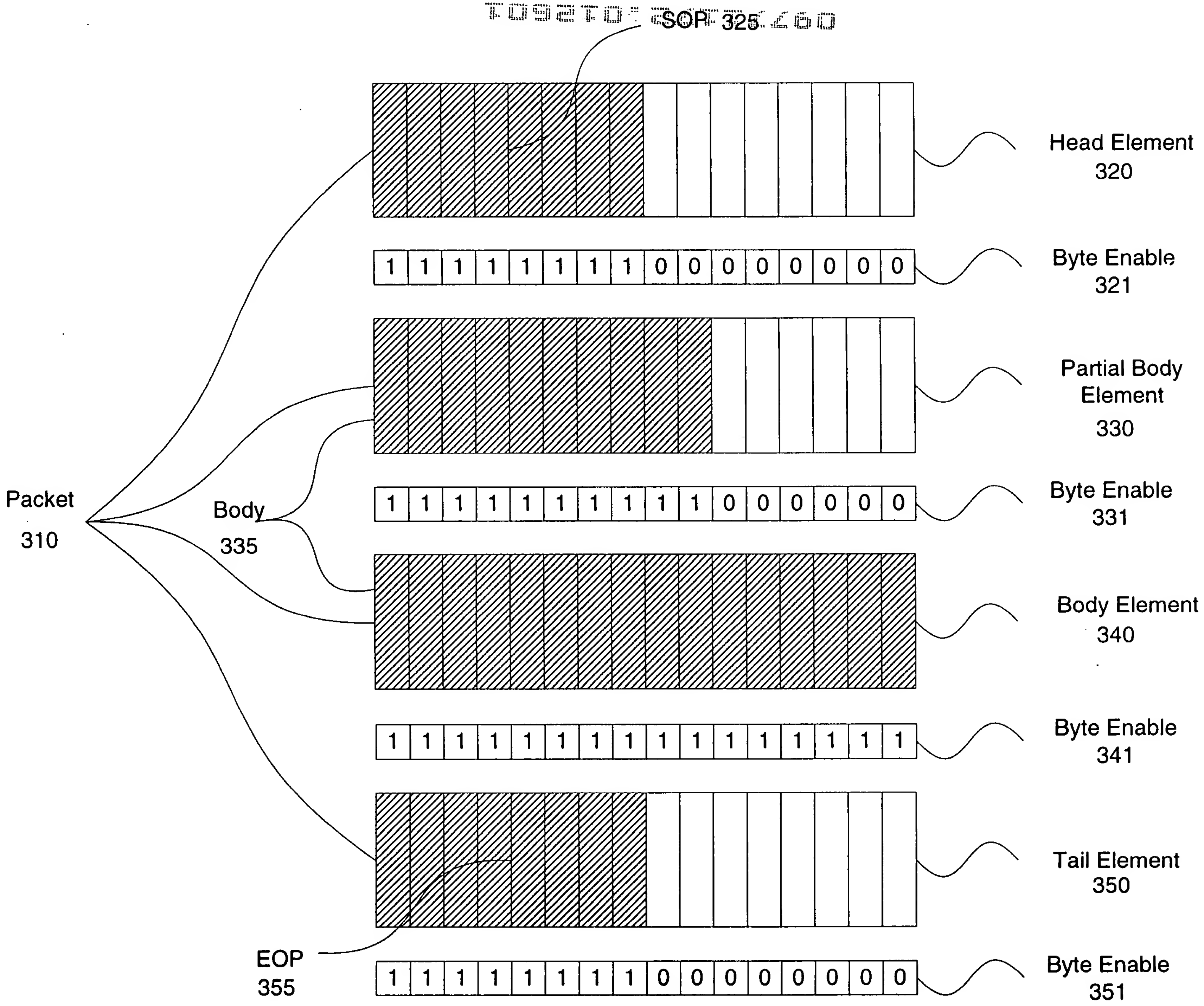
SOP 325
Head Element
320
1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0
Byte Enable
321
Partial Body
Element
330
1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0
Byte Enable
331
Body Element
340
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Byte Enable
341
Tail Element
350
1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0
Byte Enable
351
Packet
310
Body
335
EOP
355

Figure 3

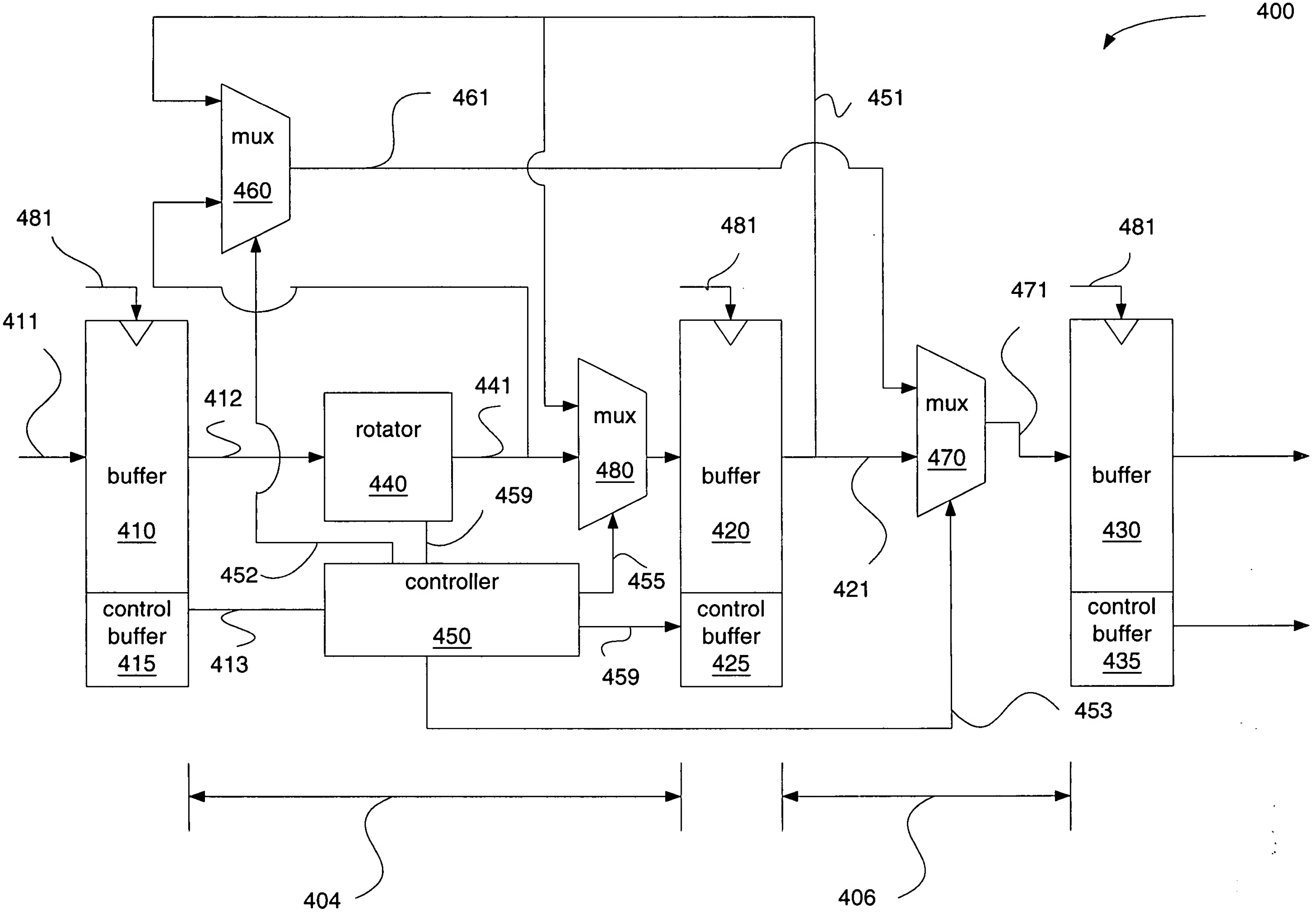
400
mux
460
461
451
481
411
buffer
410
control
buffer
415
412
rotator
440
441
459
mux
480
481
buffer
420
control
buffer
425
452
controller
450
455
413
459
421
mux
470
471
481
buffer
430
control
buffer
435
453
404
406

Figure 4

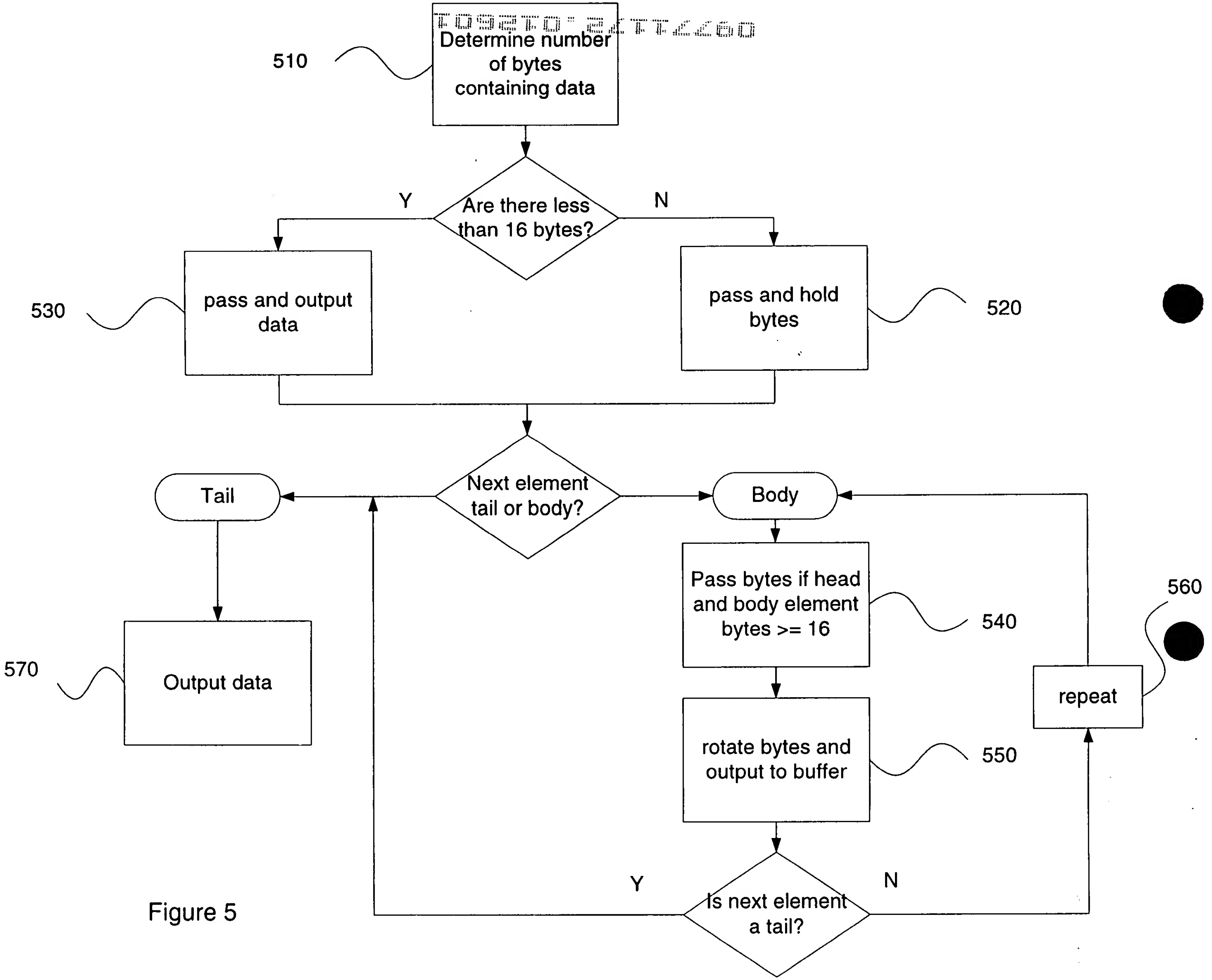
510
Determine number of bytes containing data
Are there less than 16 bytes?
Y
N
pass and output data
530
pass and hold bytes
520
Next element tail or body?
Tail
Body
Pass bytes if head and body element bytes >= 16
540
rotate bytes and output to buffer
550
Is next element a tail?
Y
N
repeat
560
Output data
570

Figure 5

	Complex Data stream Element	Mapped Data stream Element	Qualifier	Mapping Flow
610	Head	Head		Same sequence as in simple data stream
620	Body	Body		Same sequence as in simple data stream
630	Tail	Tail		Same sequence as in simple data stream
640	Hole	Hold		Hold state
650	Partial Body (Tail A)	Tail	Net Count <16	Follow tail sequence but: Suppress data aligner control output. Bypass intermediate buffer. Perform calculation using unpassed result.
660	Partial Body (Tail B)	Tail	Net Count >=16	Follow tail sequence but: Do not suppress byte enables, SOP. Suppress generation of EOP control signal. No bypass for computation.

Figure 6

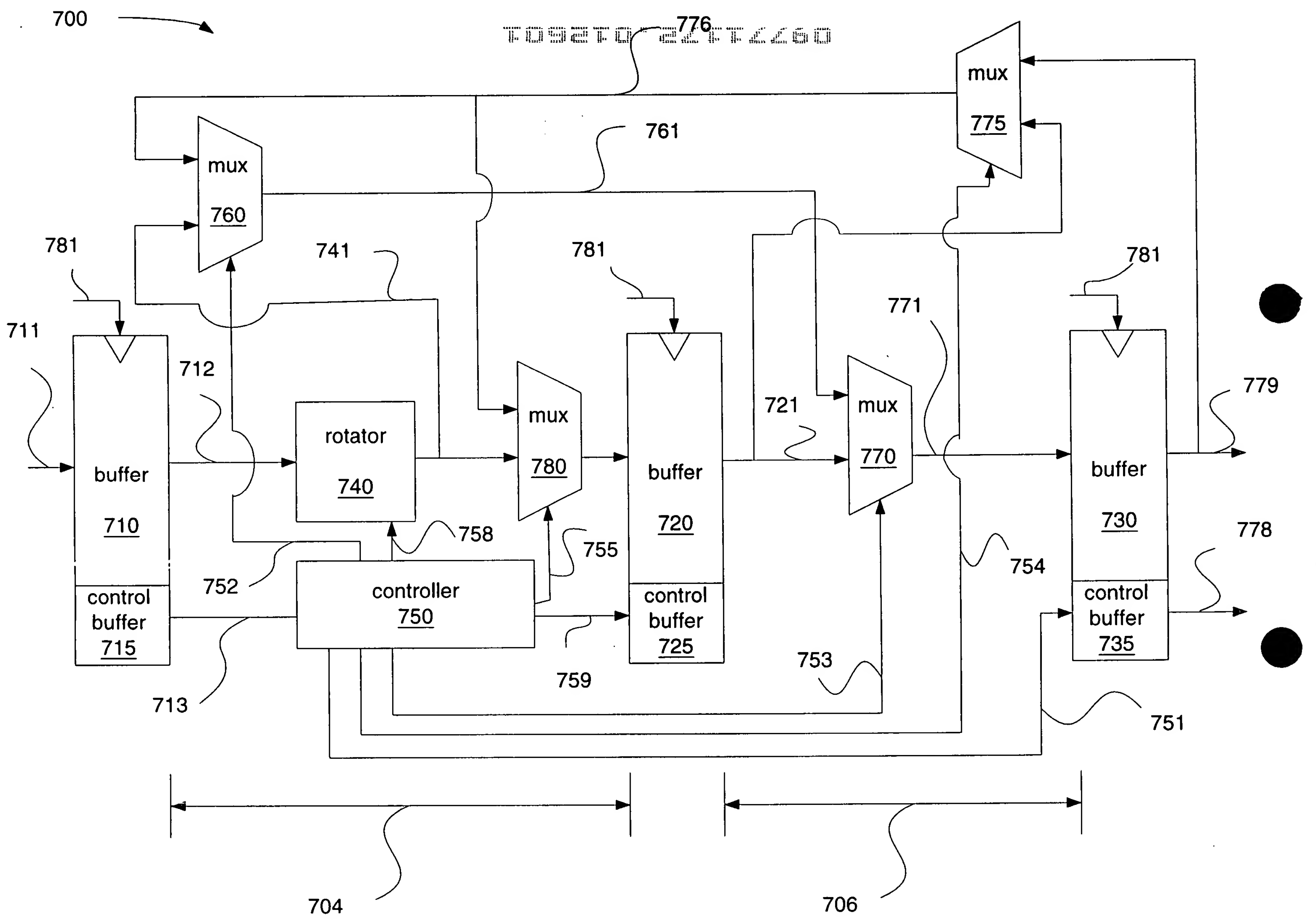
700
776
mux
775
mux
760
761
741
781
781
781
711
712
rotator
740
mux
780
buffer
710
control
buffer
715
buffer
720
control
buffer
725
721
mux
770
771
779
buffer
730
control
buffer
735
778
758
755
754
752
controller
750
713
759
753
751
704
706

Figure 7

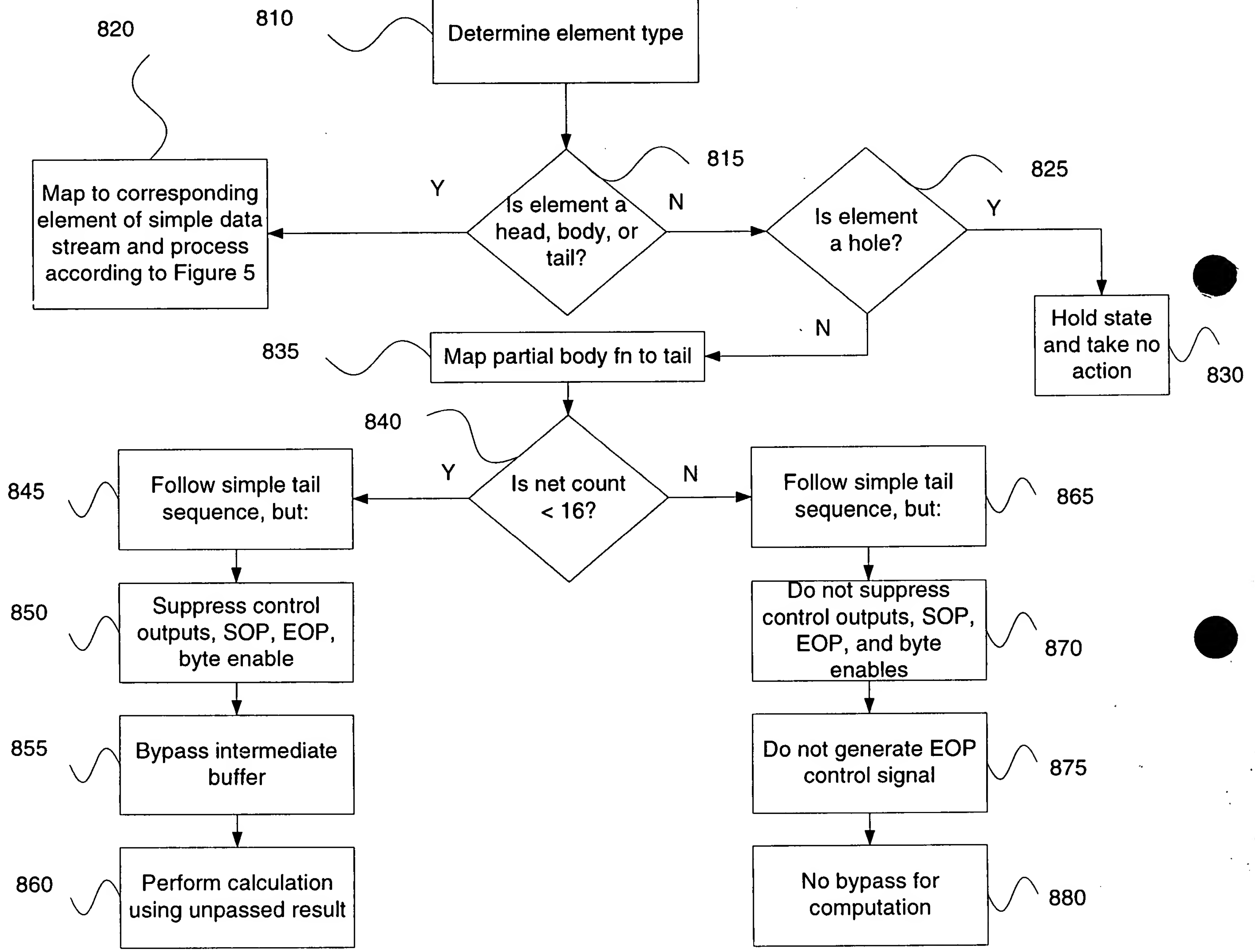
810
Determine element type
820
Map to corresponding element of simple data stream and process according to Figure 5
Y
815
Is element a head, body, or tail?
N
825
Is element a hole?
Y
Hold state and take no action
830
N
835
Map partial body fn to tail
840
Is net count < 16?
Y
N
845
Follow simple tail sequence, but:
850
Suppress control outputs, SOP, EOP, byte enable
855
Bypass intermediate buffer
860
Perform calculation using unpassed result
865
Follow simple tail sequence, but:
870
Do not suppress control outputs, SOP, EOP, and byte enables
875
Do not generate EOP control signal
880
No bypass for computation

Figure 8

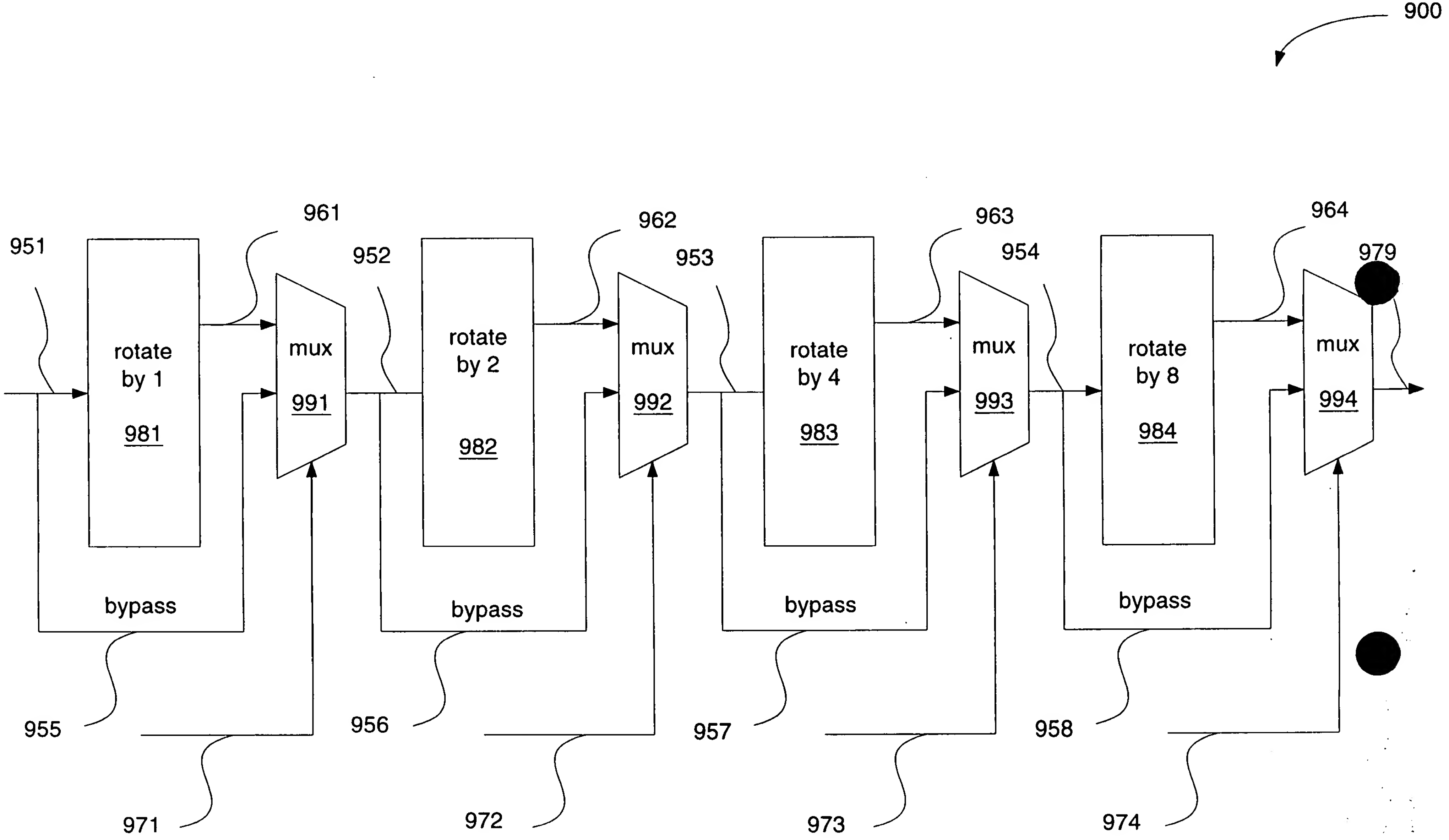
900
951
952
953
954
955
956
957
958
961
962
963
964
971
972
973
974
979
rotate by 1
981
rotate by 2
982
rotate by 4
983
rotate by 8
984
mux
991
mux
992
mux
993
mux
994
bypass
bypass
bypass
bypass

Figure 9

Serial Number	Shift Amount Value	Value of the Mux Control signal mxcntl[15:0]
1	**4'b0000**	**16'b0000000000000000**
2	**4'b0001**	**16'b1000000000000000**
3	**4'b0010**	**16'b1100000000000000**
4	**4'b0011**	**16'b1110000000000000**
5	**4'b0100**	**16'b1111000000000000**
6	**4'b0101**	**16'b1111100000000000**
7	**4'b0110**	**16'b1111110000000000**
8	**4'b0111**	**16'b1111111000000000**
9	**4'b1000**	**16'b1111111100000000**
10	**4'b1001**	**16'b1111111110000000**
11	**4'b1010**	**16'b1111111111000000**
12	**4'b1011**	**16'b1111111111100000**
13	**4'b1100**	**16'b1111111111110000**
14	**4'b1101**	**16'b1111111111111000**
15	**4'b1110**	**16'b1111111111111100**
16	**4'b1111**	**16'b1111111111111110**

FIGURE 10

Rotate_Amount	Input	Output
0	{ABCDEFGHIJKLMNOP}	{ABCDEFGHIJKLMNOP}
1	{ABCDEFGHIJKLMNOP}	{PABCDEFGHIJKLMNO}
2	{ABCDEFGHIJKLMNOP}	{OPABCDEFGHIJKLMN}
3	{ABCDEFGHIJKLMNOP}	{NOPABCDEFGHIJKLM}
4	{ABCDEFGHIJKLMNOP}	{MNOPABCDEFGHIJKL}
5	{ABCDEFGHIJKLMNOP}	{LMNOPABCDEFGHIJK}
6	{ABCDEFGHIJKLMNOP}	{KLMNOPABCDEFGHIJ}
7	{ABCDEFGHIJKLMNOP}	{JKLMNOPABCDEFGHI}
8	{ABCDEFGHIJKLMNOP}	{IJKLMNOPABCDEFGH}
9	{ABCDEFGHIJKLMNOP}	{HIJKLMNOPABCDEFG}
10	{ABCDEFGHIJKLMNOP}	{GHIJKLMNOPABCDEF}
11	{ABCDEFGHIJKLMNOP}	{FGHIJKLMNOPABCDE}
12	{ABCDEFGHIJKLMNOP}	{EFGHIJKLMNOPABCD }
13	{ABCDEFGHIJKLMNOP}	{DEFGHIJKLMNOPABC}
14	{ABCDEFGHIJKLMNOP}	{CDEFGHIJKLMNOPAB}
15	{ABCDEFGHIJKLMNOP}	{BCDEFGHIJKLMNOPA}

FIGURE 11